## Logarthmic functions are inverses of exponential functions

$$3^{5} = 243 \qquad \text{so} \qquad \log_{3}(243) = 5$$

$$3^{4} = 81 \qquad \text{so} \qquad \log_{3}(81) = 4$$

$$3^{3} = 27 \qquad \text{so} \qquad \log_{3}(27) = 3$$

$$3^{2} = 9 \qquad \text{so} \qquad \log_{3}(9) = 2$$

$$3^{1} = 3 \qquad \text{so} \qquad \log_{3}(3) = 1$$

$$3^{0} = 1 \qquad \text{so} \qquad \log_{3}(1) = 0$$

$$3^{-1} = \frac{1}{3} \qquad \text{so} \qquad \log_{3}\left(\frac{1}{3}\right) = -1$$

$$3^{-2} = \frac{1}{9} \qquad \text{so} \qquad \log_{3}\left(\frac{1}{9}\right) = -2$$

$$3^{-3} = \frac{1}{27} \qquad \text{so} \qquad \log_{3}\left(\frac{1}{27}\right) = -3$$

$$3^{-4} = \frac{1}{81} \qquad \text{so} \qquad \log_{3}\left(\frac{1}{81}\right) = -4$$

$$3^{-5} = \frac{1}{243} \qquad \text{so} \qquad \log_{3}\left(\frac{1}{243}\right) = -5$$